BY ORDER OF THE
SECRETARY OF THE AIR FORCE

AIR FORCE MANUAL 11-210
1 NOVEMBER 1996

Flying Operations

★*INSTRUMENT REFRESHER COURSE (IRC) PROGRAM*

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This manual implements AFPD 11-2, Flight Rules and Procedures, by prescribing guidance for conducting the Instrument Refresher Course (IRC). It applies to all pilots on active flying status. Address questions concerning this manual to Headquarters Air Force Flight Standards Agency, 1535 Command Drive, Suite D-305, Andrews Air Force Base, MD 20762-7002, DSN 858-5418.

SUMMARY OF REVISIONS

AFMAN 11-210, Volume 2, rescinded; information included in this manual. Chapter 1 completely rewritten. Added list of organizational responsibilities. Aligned course completion with instrument eligibility period in AFI 11-408. Clarifies the requirement for classroom instruction. Requires IRC instructors to be graduates of the AF Advanced Instrument School and to be an Instructor Pilot (IP) or have an equivalent level of experience. Makes provision for contract instructors. Establishes the HQ AFFSA IRC Home Page as the central reference point for all IRC information. Deleted Chapter 3; moved information regarding reference material to Chapter 2. Moved sample outlines, schedules, and lesson plan guides to the IRC Home Page.

Paragraph

Supersedes: AFMAN 11-210, Vol 1, 1 September 1995 and AFMAN 11-210, Vol 2, 3 July 1995.
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Chapter 1

GENERAL INFORMATION

1.1. General Concepts. The USAF Instrument Refresher Course (IRC) consists of classroom instruction and the instrument examination. Major commands (MAJCOMs), commanders, and training officers use this manual to administer the Instrument Refresher Course (IRC) as prescribed in AFI 11-401, *Flight Management,* and AFI 11-408, *Aircrew Standardization/ Evaluation Program.*

1.2. Responsibilities.

1.2.1. HQ AFFSA. HQ AFFSA will:

- Publish AFMAN 11-210, *Instrument Refresher Course (IRC) Program.*
- Maintain the HQ AFFSA IRC Home Page which will serve as the central reference point for all IRC-related information. (This information will be provided by other means for those without access.)

1.2.2. HQ AETC. HQ AETC/XOT will ensure equitable allocation of training slots at the AF Advanced Instrument School (AFAIS).

1.2.3. MAJCOMs. MAJCOMs will:

- Coordinate AFAIS training allocations with HQ AETC/XOT.
- Ensure equitable allocation of AFAIS training slots among their units.
- Inspect unit-level IRC programs regularly to verify compliance with AFMAN 11-210 and other AF and MAJCOM directives.

1.2.4. Units. Units will:

- Appoint qualified instructors as unit IRC instructors.
- Work closely with the MAJCOM to obtain AFAIS training allocations.
- Ensure a qualified IRC instructor is available to administer the unit IRC program.
- Provide IRC instructors with the appropriate resources necessary to produce the IRC.
- Schedule IRC attendance in a manner to minimize duplication of effort.
- Tailor the IRC program to meet the unit’s specific needs.

1.2.5. IRC Instructors. IRC instructors will:

- Develop and maintain the unit's IRC program according to this manual.
- Ensure the unit IRC program is current and relevant to the unit's mission.
- Create IRC examinations from the most current IRC test bank.
- Notify HQ AFFSA/XOFD of any necessary changes to the IRC test bank.
- Establish a reference library of instrument-related publications.

1.3. Compliance.

1.3.1. Attendance. All pilots on active flying status must complete the IRC during the appropriate instrument evaluation "eligibility period" as defined in AFI 11-408. Other crewmembers required by AFI 11-408 or their MAJCOM to attend an instrument refresher course may attend the pilot's IRC.

1.3.2. Method of Instruction. The IRC will be taught in a classroom format by a qualified IRC instructor. Simulator profiles specifically designed for IRC training may also be used. No other form of instruction (computer-based training, videotape, box of slides, self-study, etc.) is authorized as a sole means of instruction.

1.3.3. Course Length. The IRC will be at least six hours in length. Time spent taking the examination does not count towards the six-hour course length.

- **Simulator Credit.** If the unit IRC program includes simulator training profiles specifically designed for IRC training, then up to two hours of the IRC may be spent in a simulator.

1.3.4. Course Content. As a minimum, the IRC will contain instruction in each of the following required categories: new or revised regulations, instrument procedures, flight planning, weather, and spatial disorientation. Units possessing aircraft equipped with head-up displays (HUDs) must also cover items found in the lesson plan titled "The Head-Up Display (HUD)." (Lesson plan is on the HQ AFFSA IRC Home Page.)

- **Hot Topics.** Prior to teaching each IRC, the IRC instructor will check the HQ AFFSA IRC Home Page and cover any briefing items found in the "Hot Topics" section.

1.4. Instructor Qualification.

- **Instrument School Graduate.** IRC instructors must be graduates of the Air Force Advanced Instrument School (AFAIS) at Randolph AFB, TX; SIFC/AIFC formerly at Castle AFB, CA; or IPIS formerly at Randolph AFB, TX.
- **Instructor Pilot (IP).** IRC instructors must be an instructor pilot (IP) or have an equivalent level of experience. The intent is to have pilots teach others about instrument flying; therefore, the actual IRC instructor will be an IP or have been previously qualified as an IP.
- **Contract Instructors.** Contract instructors may teach the IRC. Contractor IRC instructors must attend AFAIS if not previous AFAIS, SIFC/AIFC, or IPIS graduates.
- **Guest Speakers.** Guest speakers from weather, ATC agencies, flight surgeon's office, etc., are highly encouraged. If practical, an aerospace physiologist or flight surgeon should be invited to present spatial disorientation and related situational awareness topics. The IRC instructor will ensure guest speaker presentations are timely and directly relevant to flight operations.

1.5. IRC Course Development.

1.5.1. Unit-Level Development. The most appropriate level for IRC course development is at the unit level. Operational commanders and unit-level IRC instructors are in the best position to accurately judge the strengths and weaknesses of their unit's pilots.

1.5.2. Sources of Academic Course Material. Academic material for the IRC can come from virtually anywhere. Here are just a few sources of IRC academic material:

- **HQ AFFSA IRC Home Page.** The HQ AFFSA IRC Home Page is the central reference point for all IRC information. The site will contain the most current IRC test bank, sample outlines for individual IRC courses, and briefings used by the HQ AFFSA IRC Roadshow. All material can be downloaded and used by the IRC instructor in developing the unit IRC program. The home page will also provide links to other sites offering instrument-related information. (Additional information in paragraph 1.9.)
- **AF Advanced Instrument School (AFAIS).** The instructors at AFAIS can also provide a great deal of information helpful to IRC instructors. Contact AFAIS at DSN 487-6047.
- **MAJCOMs.** Some MAJCOMs have developed IRC course materials for use by unit-level IRC instructors.

1.6. Instrument Examination.

1.6.1. Purpose. The purpose of the instrument examination is to provide an extensive open-book review of instrument procedures and other instrument-related subjects.

1.6.2. Minimum Passing Score. The minimum passing score on the examination is 85%.

1.6.3. IRC Test Bank. The IRC test bank will be maintained in electronic format by HQ AFFSA/XOFD. The test bank will be available for download via the HQ AFFSA IRC Home Page. Copies of the IRC test bank may also be received via e-mail or traditional mail (upon request).

- **Test Bank Changes.** Changes to individual questions in the IRC test bank are not authorized. Questions will not be used if changes in source material render the question invalid. IRC instructors will notify HQ AFFSA/XOFD of any necessary changes to the questions or answers contained in the IRC test bank.

1.6.4. Test Bank Currency. The IRC instructor is responsible for the currency of the unit's instrument examinations. Prior to constructing an instrument examination, the IRC instructor will cross-check the currency of the IRC test bank.

1.6.5. Examination Content. The IRC instructor will ensure the instrument examination contains a minimum of 50 questions. 40 questions will be taken from the IRC test bank in the following proportions:

15 questions - AFMAN 11-217, *Instrument Flight Procedures*

10 questions - AFI 11-206, *General Flight Rules*

10 questions - Flight Information Publications (FLIP)

05 questions - AFM 51-12, *Weather for Aircrews*

The remainder of the examination's questions will be developed locally. The questions must cover instrument-related areas and may be taken from MAJCOM flight directives, supplements, aircraft tech orders, or local flying directives. The additional questions can be written by the unit, written by the MAJCOM, taken from the IRC test bank, or a combination of all three methods.

1.7. Improvement Recommendations.

- Use the AF Form 847, Recommendation for Change of Publication to recommend a change to this publication.
- Send MAJCOM-approved recommendations to HQ AFFSA/XOFD, 1535 Command Drive, Suite D-305, Andrews Air Force Base, Maryland 20762-7002.

1.8. Deviations and Waivers. HQ AFFSA will authorize deviations from this manual only when an emergency or special circumstance exists. Send MAJCOM-coordinated waiver requests by message to HQ AFFSA Andrews AFB MD//XO//.

1.9. Lines of Communication. Here's how to communicate with HQ AFFSA:

HQ AFFSA IRC Home Page: http://www.aon.af.mil/affsa/irc.htm

E-Mail: jonesk@emh.aon.af.mil

Phone Number: DSN 858-5418

Address:

HQ AFFSA/XOFD

1535 Command Drive, Suite D-305

Andrews AFB, MD 20762-7002

Chapter 2

TRAINING FACILITIES

2.1. Training Facilities. Training is an Air Force requirement; certain standards need to be met if training is to be effective. The following information is provided to justify the facilities and equipment needed for IRC.

2.1.1. Simulator. The best tool to reinforce instrument training is an aircraft simulator. You can build an excellent IRC program around a good instrument simulator. It isn't necessary to have a full visual, six degrees of motion simulator. A good lesson plan can make a no visual and/or motion simulator provide positive reinforcement.

2.1.2. Classroom Size. A ratio of 45 square feet of floor space per student is recommended for flying training classrooms. Sixty-five to seventy percent of the gross square footage is the actual classroom area. For example, if you have a maximum of 20 students per class, you will require approximately 600 square feet of floor space (20 x 30 feet).

2.1.3. Lighting. Fifty foot-candles of diffused light is recommended for classrooms. Light switches should be located near the speaker podium if slide, movie, or overhead projectors are used during classroom instruction. The lighting at the front of the classroom and near the projection screen should be controllable, independent of the rest of the classroom lighting.
2.1.4. Climate Control. This is often overlooked. During the summer months, a classroom can become quite uncomfortable if air-conditioning or adequate circulation is not sufficient. You should be able to control the temperature and/or circulation in the facility being used.
2.1.5. Podium. A speaker's platform should be constructed at the front of the classroom. The platform should be high enough above floor level so you can establish eye contact with people at the back of the room.
2.1.6. Media. Projection facilities should be easy to use and not detract from the learning situation. Equipment noise is one objection to using projectors during classroom presentations. Consider using the following types of facilities:
2.1.6.1. Front Projection. To minimize projection operating noise if the projector is to be operated during lectures, an elevated projection booth can be built at the back of the classroom. An alternate plan is a portable projection cabinet (soundproofed and ventilated) from which the projector may be operated.
2.1.6.2. Rear Projection. A mirror or series of mirrors are used to project a picture on the back side of a semitransparent screen. You may also project directly on the screen. There are several advantages to this type projection:

- Projection room space requirement is very small. A closet may be used.
- Projector operating noise does not interfere with the classroom presentations.
- The projector may be pre-positioned and will not obstruct the student's vision of the speaker's podium.
- You can face the audience without the projector light bothering your vision.
- You can move about in front of the projection screen without casting a shadow.

2.2. Reference Library. Establish a reference library of regulations, manuals, and other publications for use by IRC instructors in preparing their classroom presentations. While building your library, keep in mind that the USAF recognizes valid training requirements as justification for requisitioning publications, including FLIP products. The following is a list of recommended publications:

- AFM 51-12, *Weather for Aircrews*
- AFI 11-206, *General Flight Rules*
- AFMAN 11-210, *Instrument Refresher Course*
- AFMAN 11-217, *Instrument Flight Procedures*
- AFMAN 13-209, *US Standard for Terminal Instrument Procedures*
- FAA Order 7110.65, *Air Traffic Control*
- FAA Order 7610.4, *Special Military Operations*
- FAA Aeronautical Information Manual (AIM)
- Federal Air Regulation (FAR) Part 91, *General Operating and Flight Rules*
- ICAO Document 8168, *Procedures for Air Navigation Services - Aircraft Operations (PANS-OPS)*
- ICAO Document 4444, *Procedures for Air Navigation Services - Rules of the Air and Air Traffic Services (PANS-RAC)*
- MAJCOM flying directives
- Local flying directives
- Selected Flight Information Publications (FLIP)

Chapter 3

TRAINING AIDS AND MATERIAL

3.1. General. The function of the instructor is to help the student learn. Any device that assists the learning process makes teaching more effective. Training aids enhance learning because 75 to 80 percent of what we learn is through sight. Training aids are:

- Audio and/or visual (sound-sight) devices used by instructors to help students understand and achieve instructional objectives.
- Not distinct from verbal instructions, but are an integral part of them. Visualizing should not be separated from verbalizing.

They Also:

- Bring more realism into instruction than words alone. For example, it is much easier to explain an engine and the relationships among its various parts when you have a real engine or a scale model to use as an illustration.

- Should illustrate only one main idea or procedure. The human eye, like the human mind, likes to consider one important thing at a time.
- Should not be cluttered with details. Excessive lettering should be avoided, especially on charts or drawings. Wherever possible, let your verbal explanation supply the many details that would distract the eye.

3.2. Use of Training Aids. Training aids have many uses in classroom and group instruction. Some of the more common uses follow:

3.2.1. To show the relationship of a part to a whole or to other parts. An organizational chart would be a good example of this use. Some mock-ups do the same thing.

3.2.2. To simplify complicated processes or materials for easier understanding. Schematic diagrams of circuits or systems are examples of such simplification. The particular part of the process that you wish to simplify can be shown by an exploded drawing or a cutaway.

3.2.3. To emphasize ideas. An idea will stand out if it is presented vividly with a training aid. Color, shading, and magnification are a few of the means of indicating emphasis. If something is large, or loud, it will stand out. Material can also be emphasized by its placement. In expressing an idea, you can gain emphasis by appealing to several of the senses.

3.2.4. To stimulate interest. Training aids can relate new ideas with old. They can appeal to basic interests and drives. However, the aid should direct interest to the objective rather than to itself.

3.2.5. To represent abstract ideas. Concepts, philosophies, theories, and other kinds of abstract ideas can be visualized with training aids. Adding a concrete dimension to an abstract notion may be absolutely necessary for beginning or slow students. Communism can be expressed by the hammer and sickle; democracy, by our Constitution. After establishing the symbols to represent abstract ideas, you can then place the symbols in action to gain interest. During World War II a lecturer symbolized the advancing German force by showing the jaws of a wolf on a series of maps. As the armies converged, the jaws closed until all of France was swallowed up. Visual aids such as these are simple but powerful.

3.3. Factors in Selection and Use. Before deciding whether to use training aids in a particular lesson period, you should carefully define your objectives and outline your presentation. Next determine the size of your audience, the training aids available at your base, the availability of a graphics, the complexity of your subject, and the type of classroom to be used.

3.3.1. The size of your class is an important factor in determining the type of training aid to use. For example, if you are required to explain the operating principles of a jet engine to a small group of students, a scale model can be used effectively because the students can gather around the model for a group discussion.

On the other hand, if you are instructing a large group, a film would be preferable because it can be seen by more people.

3.3.2. Whatever your choice of training aids, they should be simple and direct, and should illustrate or emphasize one main idea without too many distracting details. Where possible, use simple and inexpensive training aids, such as chalkboards, drawings, filmstrips, and slides.

3.3.3. Training aids can be made more effective with the use of imagination and resourcefulness. It is good to experiment with various combinations, but be sure that each aid helps put across your objectives. Do not build your instruction around the training aid; rather, tailor the aid to meet the demands of the objective. The art of conceiving training aids is called “visualizing.” As an instructor, you will have to use your imagination and knowledge to design an aid that expresses the exact idea you have planned. These guidelines will help you in visualizing:

- Bring additional senses into action. Can you express the sound visually? Can you add the aural dimension to your picture?
- Make full use of symbols. The flag expresses our nation more forcefully than a dozen books or lectures. Try to symbolize abstract ideas.
- Bring in factors of known interest. People, bright colors, and pleasing designs will hold attention and emphasize the main idea. Your students may have special interests to which you can appeal.
- Be professional. Your aids should be simply designed and neatly prepared.

3.4. Types of Training Aids. Of the many devices used to aid students in the learning process, the most common and effective are the chalkboard/whiteboard, the overhead projector, the 35mm projector, film, and video tapes.

3.4.1. Chalkboard/Whiteboard. The chalkboard/whiteboard is the most widely used tool of learning. Besides being readily available, its versatility and effectiveness make it a valuable aid to most types of instruction. It has two important characteristics: first, the material presented on it can be erased and the surface used again and again; and second, the board serves as an excellent medium for classroom activity that involves joint student-instructor activity. The following practices are fundamental in the use of the boards:

- Keep the boards clean.

- Erase all irrelevant material. Personal notes or examples that only you can see can be written in pencil to serve as a reminder.
- Keep chalk, markers, erasers, cleaning cloths, rulers, and other aids readily available to avoid interruption of the presentation.
- Organize and practice presentations in advance.
- Write or draw large enough for all in the group to see. One technique requires the letters/numbers to be one inch high for every six feet the board is from the students.
- Do not overcrowd the board. Leave a margin around the material and sufficient space between lines of copy.
- Keep the material on the board simple and brief.
- If necessary, use the ruler, compass, or other devices in making drawings.
- Use colored chalk or markers for emphasis.
- Underline statements for emphasis.
- Use a pointer when discussing information on the board.
- Stand to the side of the material being presented so that all students will have an unobstructed view.

3.4.2. The Overhead Projector. This adaptable and inexpensive aid can be used to project transparencies onto a screen. You can face the class and use this device as you lead a discussion, direct a conference, or visually illustrate a point. The optical system of the overhead permits placing the projector near the screen, making it possible to project and change transparencies from the front of the room, eliminating the need for a separate operator. The horizontal projection tables allow the instructor to use the screen like a chalkboard by writing on slides or sheets of transparent plastic with a grease pencil. By the use of the opaque attachment, the overhead projector can be used to show pictures and information not available on transparent slides. To use the projector, you should be familiar with the various parts and controls.

3.4.3. 35mm Projector. This visual aid is popular in the classroom due to its compact size, simplicity of operation, low cost, and effectiveness. The slide projector can be used with a sequence of slides or for one or two illustrations. In either case, the mere flick of a switch adds a visual representation of an idea.

3.4.3.1. Using 35mm slides is sometimes better than using overhead transparencies since the slides can be prearranged and the lecturer can avoid the interruption caused by changing transparencies. Other important features are that classroom lights may be left on while a slide is projected on the screen and there is no requirement to have the projector in the middle of the classroom.

3.4.3.2. Your base graphics may be able to create quality products from a rough sketch. They should also have the tools for self-help creating of slide masters. The photo lab can normally take the pictures of your masters and turn them into finished slides. Don’t forget that pictures from books and magazines make professional looking slides.

3.4.3.3. One disadvantage of the slide projector is that the time involved in processing the slides prevents the immediate use of that sudden bright idea for an illustration. This disadvantage is generally offset, however, by the fact that 35mm slides are comparatively easy and inexpensive to process.

3.4.4. Films and Videotapes. Because films and videotapes bring the viewer close to real-life situations, they are highly effective training aids. Consider, for example, a film on air defense. When the student sees an operator in an air defense control center pick up a microphone and alert the interceptors that seconds later roar from the runway, the situation is completely realistic. This type of presentation makes a lasting impression.

3.4.4.1. A film or videotape enables the student to learn much in a short period of time since it is a strictly controlled presentation. It is organized to omit unnecessary details and concentrate on a few selected points. For example, in a conducted tour of an F-16 factory, the student would need time to observe all the procedures along the assembly line, but a film can pass over the minor details and show the important assembly procedures quickly and vividly.

3.4.4.2. Films and videotapes also simplify standardized instruction. Because the procedures in films and videotapes are purposefully arranged, all students learn to perform the operation in the same way. This is an advantage where uniformity is desired.

3.4.4.3. Due to its realistic approach, a good film or videotape can hold the attention of a large group of students. You can accelerate the speed of the film to minimize unimportant areas and decrease it to emphasize main points, giving you complete control of your time.

3.4.4.4. Before showing a film or videotape, you should tell your students areas to look for. This will increase student comprehension of the important procedures and principles to be shown in the film or videotape. After showing the film, follow up with a review of the main ideas.

3.4.4.5. Good films and videotapes should be used frequently to clarify or emphasize instructional objectives. Although films and videotapes cost more than other types of training aids, the long-range results usually more than offset the immediate expense.

3.4.4.6. Many of the public education channels on television may be an alternative source for the background or lead-in for your course.

3.4.5. Computer Projection Systems. There are a variety of excellent ways to integrate computers into your presentations and more become available every day due to the rapidly-changing world of computer technology. Computer presentations are inexpensive to create, easy to maintain, and represent the "state of the art" in presentation technology.

3.5. Sources of Ideas. Regardless of the type of aid you choose, the design will determine its effectiveness. Designing effective training aids is a challenge to the instructor. Without fresh ideas, you run the risk of becoming dull or uninteresting. The following sources can be drawn upon for inspiration.

3.5.1. Visual Aids Experts. Use the people who are available to help you. Many schools have sections staffed by professional artists or visual aids authorities. They can be an invaluable source of help.

3.5.2. Newspaper and Magazines. The morning paper may have the very picture you are looking for. There are many processes available for transferring pictures to slides or charts. Also, advertising layouts can suggest good ideas in planning slide designs.

3.5.3. Television Commercials and Programs. The cash investment in television time forces sponsors to plan good audiovisual materials. Copy their techniques. Observe their use of symbols and composition to emphasize ideas.

3.5.4. Other Instructors' Use of Aids. Cooperation and sharing of ideas between instructors is an important part of teaching. This free exchange of ideas is particularly important in training aids.

3.5.5. New Training Aid Materials and Techniques. New processes, new kinds of projectors, and new slide materials are continually being developed and made available. Keep up to date by reading current trade publications and books.

3.5.6. Notebooks. Whenever you get an idea from any source, write it down. If you build your own permanent reference for ideas and inspirations, it can become your most valuable instructional tool.

3.6. Training Materials. Each pilot should be provided a publications kit containing all publications needed for classroom instruction and the instrument examination.

NOTE: FLIP General Planning (GP) and the Flight Information Handbook (FIH) must be current. Other FLIP products may be out of date for the sake of economy.

Chapter 4

INSTRUCTOR PREPARATION

4.1. Introduction. This chapter deals with the qualities of a good instructor, selection of teaching methods, lesson organization, effective lesson delivery, and training aid production and use. It is written primarily for new instructors or those whose instructor experience has been limited.

4.2. Qualities of a Good Instructor. Anyone who stands up in front of others to guide learning activities is going to be scrutinized and analyzed critically by the group. Strengths and weaknesses will be consciously or unconsciously noted by the group and instructional effectiveness will be directly affected by the balance of strengths versus weaknesses. Knowing this, each instructor should strive to become one who can be approached, respected, admired, and emulated or imitated.

4.2.1. Here are some examples of personal qualities, capabilities, and characteristics you should have or strive to attain: Be neat in appearance, whether in a uniform or flight suit. Be prompt in meeting the scheduled commitments. Exhibit enthusiasm for your work and interest in your students as individuals and as professional pilots. Be sincere in what you say.

4.2.2. If you personally disagree with the standard method try to see the good points in it and sell those. If you think you have a better approach seek approval from the appropriate authority. Be an authority on your subject and you will have confidence. Fear is based on the unknown; confidence, on knowledge. With confidence and knowledge you can think on your feet and gain respect.

4.2.3. As an instructor you must be patient with the sometimes frustrating errors and inadequacies of the students. Be courteous in dealing with them. By being interested in their progress and helpful with their problems, you will be an acceptable leader of their learning activities. These qualities, applied in a tactful and friendly manner, give you indisputable authority.

4.2.4. Develop your vocabulary so you can express yourself clearly. Watch your diction and pronunciation. It would be nice if everyone had a voice like Paul Harvey, but what is important is how you use the voice you have. By conscious use of tone and volume variation, varying the rate of speech, and inserting purposeful (not verbal) pauses, any voice can be made effective and interesting. You do these things naturally in everyday conversation, so practice using the same conversational delivery on the platform.

4.2.5. The first prerequisite of successful instruction is a strong desire to teach. How do you get this desire? Generally the instructor's job requires self-motivation. Supervisors can help by providing facilities and materials and by pointing out the importance of the job, but the drive to excel as an instructor must come from you.

4.3. Teaching Methods. An integral part of preparing a lesson is the selection of the instructional methods you will use. The principal types of activities are telling-listening (lecture), discussing or problem-solving (discussion), showing-observing (demonstration), and doing (performance).

4.3.1. Classifying any one lesson may be inaccurate because an instructor will usually use combinations of these methods, often at the same time. For example, if you are teaching your students how to thread a motion picture projector you tell them about it while you demonstrate the mechanics involved. You ask them and they ask you questions. You have the students go through the procedures and help those who are having trouble by explaining and showing it to them again. In this case you have not limited yourself to one method, but are using all of them in combination.

4.3.2. The following paragraphs explain in detail the different methods of instruction. An understanding of these methods will enable you to combine, adapt, and modify them to meet your own needs and those of your students.

4.3.3. Lecture Method. The lecture is an oral presentation of facts, principles, or procedures the instructor wants the students to understand. The preparation, planning, and presentation rests solely on the instructor. It is the most commonly used method in systematic, organized instruction for adults. The lecture is the most basic tool of teaching.

4.3.3.1. The lecture introduces students to a new subject, and is used to summarize ideas, show relationships between theory and practice, and re-emphasize main points. In many cases, the lecture alone is inadequate so many instructors combine the lecture with other instructional methods. For example, to introduce a group discussion the lecture would increase the students' interest in the subject and motivate them to begin the discussion.

4.3.3.2. A successful lecture requires practice. Practice builds self-confidence. With several rehearsals you will gain assurance from more accurate timing and greater familiarity with your material. You will also improve your wording and presentation techniques (use of voice and body movement). By rehearsing you can smooth out the mechanics of using notes, visual aids, and other instructional devices. Ask your colleagues to attend your practice sessions so they can critique your presentation and make constructive suggestions. Their comments can help you determine whether your supporting materials and visual aids are putting across your ideas. Another option is to video tape yourself and provide your own critiques.

4.3.3.3. Use of Language. In lecturing, you should use simple words whenever possible. The newspaper is a good example of the use of simple words. You may include picturesque slang and free-and-easy colloquialisms when these are appropriate to the speaking situation, but avoid substandard English which detracts from your dignity as an instructor and could possibly insult the intelligence of your audience. If you use technical terms explain them clearly so no one is in doubt about their meaning. Specific words are more lively than general words. For example, the specific phrase "a leak in the gas line" is more effective than the general term "mechanical defect". Another source of variety is in the length of your sentences. The consistent use of short sentences results in a choppy style, but long sentences could be difficult to follow.

4.3.3.4. Types of Delivery. The lecture may be given by (1) reading from a manuscript, (2) reciting memorized material without the aid of a manuscript, (3) speaking extemporaneously from an outline, or (4) speaking without preparation (impromptu delivery).

4.3.3.4.1. Reading a manuscript is sometimes justified to prevent being misquoted, especially if your subject is controversial. However, the disadvantages of reading a presentation far outweigh the advantages. Few people can read with a personal touch. Most lectures that are read tend to be dull and monotonous, and the audience soon loses interest. The reading technique is so inflexible that it allows you little opportunity to maintain visual contact with your students or to adjust to their reactions. In addition, many students will resent being read to, because they feel they can read for themselves at a more "convenient" time.

4.3.3.4.2. Memorizing written material and reciting it without the aid of a manuscript has many of the disadvantages of the reading technique. Because you are concentrating on what comes next, it is difficult to observe and adjust to student reaction. Any interruptions, such as questions from your students, may cause you to forget keywords, sentences, or entire passages. In trying to take up where you left off, you may repeat material unnecessarily. The reciting technique, like the reading technique, is rather impersonal and inflexible and results in the loss of student interest.

4.3.3.4.3. Speaking extemporaneously allows you to speak from a mental or written outline and not read or memorize what you are going to say. By leaving the choice of words with which to express an idea until the actual presentation, it is more personalized. Since you are talking directly to the students, you can readily observe their reactions and adjust to their responses. Because you have not memorized what you are going to say, you have better control of the situation. Thus you can change your approach to meet any emergency and can treat each idea according to student response. For example, if you realize from their puzzled expressions that a large number of students failed to grasp an idea, you can elaborate upon the idea until student reaction indicates that they understand you. Because the extemporaneous presentation reflects your personal enthusiasm and is more flexible than other methods, it is more likely to hold the interest of your audience. For these reasons use of the extemporaneous method is preferable when possible.

4.3.3.4.4. Impromptu delivery requires the speaker to rely on personal knowledge and skill. An impromptu presentation might be acceptable if the subject area is broad, if you have an excellent background for speaking on the topic, or if you are expected

to summarize important points rather than give a detailed analysis. However, it is inadvisable to attempt an impromptu lecture if you are given adequate advance notice.

4.3.3.5. Advantages of the Lecture. In the lecture, many ideas can be presented in a relatively short time. Facts and information can be concisely organized and logically presented in rapid sequence. This is unquestionably the most economical teaching method in terms of the time required to present a given body of material.

4.3.3.5.1. The lecture can be used effectively to introduce a subject. To ensure all students are given the necessary background material for a particular subject, the instructor can present this basic information in lecture form. Such use of the lecture enables students with varied backgrounds to obtain a common understanding of principles and facts. Because of the speed with which ideas can be presented, the lecture can also be used for the rapid summarization of facts. The lecture has proved to be a convenient method for instructing large groups, and it can be used to present information not readily available in other forms.

4.3.3.5.2. The lecture is useful and effective as a supplement to other teaching devices and methods. If the number of books are limited and the students have neither the time required for research nor access to reference material, the pertinent information can be economically presented by the lecture method. Usually a demonstration is preceded by a brief lecture which gives it direction and purpose. Similarly, meaningful discussions are possible only when the class knows something about the subject matter to be discussed. The lecture is one means of preparing a class for discussion.

4.3.3.6. Limitations of the Lecture. The lecture normally does not provide for student participation. Learning is an active process and the lecture tends to foster passivity and teacher-dependence on the part of the students. As a teaching method, the lecture falls short in certain types of learning outcomes. For example, motor skills required for flying can not be learned by listening to a lecture. They can be acquired only by actual performance. The lecture does not enable the instructor to estimate student progress before an examination. Within a short period more information may be presented than the students can absorb, but the lecture gives no accurate means of checking student learning. The lecture method makes it difficult for many instructors to hold student attention throughout the class period. At its best, the lecture demands an instructor who possesses both a dynamic personality and skill in speaking.

4.3.4. Discussion - A Natural Teaching Approach. The old saying that two heads are better than one applies very well in the classroom. When material can be presented by having students recall ideas or past experiences, a feeling of belonging is fostered. Discussion is a natural approach to learning. Because it is particularly adapted to student participation you should use it whenever possible, especially if dealing with small groups. How can you use this method to instruct instrument flying? Let's assume that you are a ACC fighter instructor pilot who has previously given a lesson on a particular weapons delivery on instruments. You have explained what is to be done and when and how to do it. You have recommended procedures and suggested techniques. Now, for the information to be really meaningful to your students they need to understand why they must perform the maneuver just the way you described it. This question of "why" is one that can be explored and learned through discussion. Another example of using the discussion method is in teaching flight regulations and publications. Rather than covering only what the regulations say you could discuss their application to specific instances which occur in your job. If you give it some thought, you can find many areas which are well adapted to the discussion method of teaching in your instrument training program.

4.3.4.1. Planning a Discussion. Planning for a guided discussion is basically the same as planning for a lecture. You start with the lesson objectives. In the discussion method the objectives must be stated specifically. If you clearly establish in your own mind the ideas which you plan to have the students develop during the discussion, you can better plan for the effective use of questions. Next you conduct research and organize your material. And finally, you plan your class activities and prepare your lesson plan. Since these last steps provide for active student participation, you should observe the following suggestions:

- Clearly identify discussion areas and fit them to the needs of the group.
- Prepare to use questions that will open areas of discussion.
- Keep the objectives clearly in mind.
- Prepare to control and guide the discussion without dominating it.
- Recognize student needs and contributions.
- Make assignments which will provide a background for discussion and which will stimulate students to participate.
- Prepare to summarize material as each major topic is completed.

4.3.4.2. There may be times when you will have no opportunity to assign preliminary work, and you will face the students "cold" for the first time. In such a case it is practical and advisable to give the students a brief, general survey of the topic. To do this, you may have to prepare a short preliminary talk or outline. If this will not provide the students with the necessary background, you should choose another method.

4.3.4.3. Leading a Discussion. How do you lead a discussion? "Honesty is the best policy" certainly applies in the classroom. Be as well informed as possible, but if you are asked a question and you don't know the answer, admit it. Ask the group to volunteer information on the subject. Usually, one of the students will help you out. Sometimes you will have to "play dumb" in a discussion group. Students may use terms that are familiar to you but new to other members of the class. When this is the case, ask for further explanation. The questioning technique helps to ensure that every member of the group gains the desired understanding, and it discourages bluffing. Students may think they know all about the subject to be discussed, but

when faced with explaining it to the class, they are not so sure. Let them express themselves until their ideas are clearly expressed and until the entire group understands. To enhance student interest and stimulate discussion you should create an open atmosphere. In such an atmosphere each student has the opportunity to discuss problems on the subject and feels free to do so. Moreover each feels personal responsibility to contribute. As the instructor you should make your students feel that their ideas and active participation are wanted and needed. An open atmosphere encourages them to relax and to give their best.

4.3.4.4. Questions - The Lifeline of discussion. Your questions will be determined primarily by your lesson objectives. For example, a lesson objective might be for students to determine a Visual Descent Point (VDP) on a non precision approach. One of the first problems is to get the students interested in VDPs. You can arouse their interest by asking them to explain what a VDP is.

4.3.4.4.1. You should next anticipate student answers. Students will probably define VDPs based on how they use them. Differences of opinion will stimulate them to discuss the proper uses of VDPs. It is often helpful to write their definitions on the chalkboard/whiteboard. This will keep them posted on their progress in developing the discussion.

4.3.4.4.2. After you have caught their interest you might ask your students to explain how VDPs are determined on the instrument approach procedure. Very few will realize that it is normally based on the VASIs and the lowest MDA published on that procedure.

4.3.4.4.3. The student discussion for each lesson objective might be planned by the same procedure. However, be sure that each question is designed to guide the students toward the lesson objective.

4.3.4.5. How to Ask Questions. After you ask a question, be patient. Give the students a chance to react. You will have the answer in mind before you ask the question, but the student has to find the answer and think about it. This thinking process takes time. You must allow the student enough time to prepare an answer.

4.3.4.5.1. Sometimes students will not understand your question. When you notice a puzzled expression, ask the question again but phrase it a little differently. A good rule to follow is to state your key question only after building up to it with secondary questions. During this buildup the students are “warming up”, and they will be more responsive and ready to answer the primary questions.

4.3.4.5.2. Students may lack the necessary background to understand what you are talking about. If this is the case, explain your idea and elaborate upon it. Build upon it so that you can make a transition to the next point of discussion. Lead into your next idea with a question and let the group pick up from there.

4.3.4.5.3. In preparing your questions it is well to remember that your purpose is to create discussion, not merely to get answers. Avoid questions that only require “yes” or “no” answers. Your leading questions should usually begin with “how” or “why”. For example, it is much better to ask, “How can we use training aids most effectively in teaching?” than it is to ask, “What kind of training aids are available?” The second question will produce a recital of training aids but no genuine discussion.

4.3.4.5.4. How well you, as an Air Force instructor, can conduct a discussion lesson depends to a great extent on how well you can use the questioning technique.

4.3.4.6. Keep the Group on the Subject. If your students are to achieve the lesson objectives, you must see that the discussion does not deviate from the subject matter. When this happens you should take over. Summarize the group’s ideas and state a question that brings the discussion back into line. It may be difficult to decide when students have deviated from the desired discussion. A good rule is to let the group proceed on a topic as long as they seem to be profiting from the exchange of information and are progressing toward the objective.

4.3.4.7. Instructional Aids. Aids which will stimulate student discussion include films, filmstrips, lectures, and outside reading assignments. Any aid which catches the students’ interest and makes them think about the desired topic can be used to stimulate discussion. In the use of any aid, be sure to tell your class what to look for and why it is important. Films are especially effective in providing students with a common background for discussion. The chalkboard/whiteboard is probably the most convenient aid to use during a discussion. It is excellent for summarizing ideas and for keeping key ideas before your students.

4.3.4.8. Conclusions. In concluding a guided discussion you should summarize student responses, reviewing the ideas which were discussed with the lesson objectives. In this final summary be sure to emphasize and clarify the objectives using student contributions as supporting material. If you fail to do this the students may leave the discussion without knowing what they accomplished. The conclusion should be brief and interesting.

4.3.4.9. Group Dynamics. Discussion in the classroom, like an informal discussion at home or during a coffee break, involves personal feelings as well as subject matter. These feelings, or personal relationships among the members, are the dynamic forces that work within a group. If one student says “You’re wrong, I can’t agree with that”, when another states an opinion in a directed discussion a force is created which may halt the learning process. Therefore, if you intend to use the discussion method in teaching you need to know how to assist your group in handling these personal relationships constructively. We know that everyone has certain personal-social needs in common. If we expect our students to concentrate on the content of the lesson, we must do our best to see that these personal-social needs are satisfied. All members of the group must treat others with consideration and respect.

4.3.4.9.1. We believe in the worth of the individual. We should therefore respect the good qualities of each student and try to understand their weaknesses. To develop such an attitude in your group your own example will be the single most important element. If you demonstrate that you recognize the worth of every person in the class, your students will follow your example. You can demonstrate this attitude by your tone of voice and facial expression as well as by what you say.

4.3.4.9.2. By recognizing and praising worthwhile ideas, you can bolster self confidence in your students and encourage them to be relaxed and natural. By varying your approach to different aspects of your subject, you can provide your students with variety and satisfy their need for new experiences. Other specific ways to satisfy these needs will occur to you if you will give the matter thought.

4.3.4.9.3. Your teaching will be more effective if you will help each student feel that he or she is a member of the group. Frequent use of the word "we" is useful. Refer to the common problems of the group and combine the individual contributions to show how the group can solve these problems. Here again, your own experience and some careful thought will lead you to further techniques in developing a comfortable group atmosphere.

4.3.4.9.4. Finally, the type of leadership which you display in group discussion will influence your effectiveness as a teacher. The leader who creates an open atmosphere and respects the thoughts, opinions, and feelings of the group will reap great rewards. Exercising rigid control will improperly focus attention on you rather than on the lesson, but too little control is equally bad, as it will leave the group without proper guidance. By thoroughly preparing in advance, you are free during the discussion to use judgment and discretion in handling any situation that may develop.

4.3.4.10. Advantages of the Discussion. The discussion method is particularly valuable because it pools the knowledge of all who participate. This gives a broader range of ideas than is normally possible in the lecture. Discussion stimulates students to prepare and participate more actively in the learning process. They will usually put more effort into preparation if only to save themselves embarrassment during the discussion. Because the students themselves develop the ideas necessary to accomplish the objectives, discussion is usually much more interesting than a lecture. Since there is more participation and interest, the material is more likely to be retained longer. By listening carefully to the discussion, you can more accurately judge the students' understanding of each idea developed. There is little danger that the material will he covered at a rate too rapid for student understanding.

4.3.4.11. Limitations of the Discussion. For the lesson to be successful, each student must participate freely in the discussion. Therefore, the discussion method is limited to fairly small groups. Also, the problems of control increase sharply as the size of the group increases. The extended exchange of ideas in a discussion takes a great deal of time so less material can be covered in a given period than with other methods. To be effective, the discussion must be kept on the subject and moving toward the objective. However, it can easily deteriorate into a bull session or a contest of wits between students. To prevent this you must be highly capable in using tact and handling people. The discussion method is probably the best for refreshing pilots on instrument procedures and techniques.

4.3.5. Demonstration - Performance Method. The demonstration and performance methods of instruction are used together so often that they should be studied together. A good demonstration is usually needed to prepare students for performance. Some student activity is an integral part of the learning process so the value of student performance in the learning situation is unquestioned. Learning by doing is the most fundamental of all learning principles. This meaningful experience is derived from active participation.

4.3.5.1. The Demonstration. A demonstration is a combination of showing and telling and is designed to appeal to the senses of sight and hearing. A demonstration can give vivid meaning to a statement. One instructor found it difficult to teach approach lights with only pictures and words. By building an operating replica of an approach light system, he was able to demonstrate how the various types of lighting systems were related. This demonstration gave visible meaning to the proper use of approach lights by pilots.

4.3.5.1.1. Demonstrations save instructional time. Usually a principle or operation can be demonstrated in less time than it would take to adequately describe it in words, and the learning resulting from the demonstration is more accurate, detailed, and complete. Demonstrations are usually more realistic than discussion and students are better able to "get the feel" of the subject.

4.3.5.1.2. Demonstrations must be well planned and executed if they are to be effective. A poor demonstration may fall flat and make the students feel that the project is too difficult to understand if their instructor can't execute it properly. Use discussion techniques to prepare students for the demonstration. The techniques of discussion and of demonstration are so closely interwoven that either or both may be applicable at any given time.

4.3.5.1.3. Many lessons prove ineffective because the purpose and value of the related activities are not made clear to the students. Students must understand what, why, when, where, and how. That is, they must understand what you are going to do, why the project is necessary, when and where it has practical application, and how it is done.

4.3.5.1.4. When planning a demonstration lesson give consideration to the size of the class, the seating or standing arrangement, the size and type of demonstration equipment, the understanding and background of the students, and your own demonstration ability.

4.3.5.1.5. When demonstrating, "suit the action to the words and the words to the action." That is, keep the words and action synchronized throughout the demonstration. It is confusing to listen to words which are "out of phase" with the action.

4.3.5.1.6. The average person is not skilled in the art of observation. After a traffic accident, one can get almost as many versions of what happened as there are witnesses. Students are not necessarily skillful observers who may vary greatly in their ability to recall what they have just seen. It is both unscientific and unfair to attribute differences in visual comprehension exclusively to differences in degree of attention. Attention is, however, a contributing factor.

4.3.5.1.7. Take it easy during the demonstration. Remember that "the hand is quicker than the eye" and that you are not giving a slight of hand performance. Place special emphasis on important facts, difficult manipulations, and safety precautions. Repetition of the demonstration is valuable. A careful budgeting of time will usually make such repetition possible.

4.3.5.2. The Performance. Like other teaching methods, the use of the performance method is determined primarily by the instructional objective. The performance method is best suited in teaching a specific skill, such as operation of the computer and military learning situations that require mechanical skills.

4.3.5.2.1. Because students are performing a certain act does not mean that they will learn well or that they will learn at all. Some biology students cut up earthworms but learn little except to dislike the course. If the students are not interested in the subject or do not exert conscious effort, they will not learn by doing. Motivation is just as important in the performance method as in the lecture or discussion.

4.3.5.3. Essentials of the Performance Method. Most Air Force learning involves doing. From the simplest administrative procedures to the piloting of a complex aircraft, individual and group performance is necessary. Because performance, or doing, is the heart of Air Force learning activities, we should examine the factors that cause learning when the performance method is used. These factors are:

- **Motivation.** Students can be motivated to learn a skill if they understand its importance in terms of their jobs, their status, or their safety. They should know how the skill will be useful. You must interest them in wanting to learn by doing.
- **Explanation.** Tell your students what they are supposed to do and describe the product of their efforts. During the explanation, answer their questions. Some discussion of theory may be necessary before they achieve the desired understanding.
- **Demonstration.** You should show the students what they are supposed to do. You may demonstrate a skill or procedure that the students will use to achieve the lesson objective. This phase often includes appropriate explanation. For example, a group of pilots must learn to fire at a ground target. One instructor takes to the air and demonstrates when to fire, when to stop firing, and when to pull up from the target. Another instructor on the ground explains what is taking place in the air. Soon after this demonstration the students will be required to go through the same procedure with an instructor along to correct them when they make errors.
- **Student Performance and Instructor Supervision.** This is action, or doing, by the students. If the task is a simple one it may follow the demonstration; if it is complicated, it should be divided into steps. Whenever students are performing, supervision is needed to see that they follow correct procedures and meet established standards.
- **Evaluation.** The evaluation step is the final and perhaps most important factor in this method. It is here that you determine how well your students have learned. To accomplish this, there must be a separate and distinct evaluation step in which the students perform the skill with no assistance from you.

4.4. Selection of Method. Your selection of an instructional method or combination of methods should be based primarily on the lesson objectives. The nature of the student activity should indicate to you the method that could be used to stimulate and guide the students. For example, if the student must gain proficiency at flying instrument approaches, then he or she must be allowed to get into the airplane and actually practice flying the approach. You must explain and demonstrate how the approach is to be flown. You must also present the student with several problem situations and approaches to assure broad student proficiency. This indicates that the selection of an instructional method is an integral part of lesson planning.

4.4.1. The selection of an instructional method hinges primarily on three things:

- The lesson objectives.
- The type of student activity necessary.
- The type of instructor activity required.

4.4.2. The objectives indicate the type of student activity which dictates the instructor activity or method to be used.

4.4.3. Limiting Factors in Selection of Method. In planning instructional activities, you may not always be able to use the method that you prefer because of certain limiting factors. In addition to the nature of the objectives and the type of activity required, you should consider:

- The background and ability of the students.
- The number of students.
- Your ability as an instructor.
- The time allotted to the lesson.
- Available facilities.

4.4.4. You should consider these factors (and any others which would bear on the effectiveness of the lesson) as limiting, but not determining, factors. They have their effect, but they are not overriding or conclusive.

4.5. Lesson Organization. Speech authorities and educators tell us that poor organization of ideas interferes more seriously with student understanding than limited knowledge of subject matter, annoying mannerisms, and poor delivery - combined. Although the symbols we use must mean similar things to all people, in communication, individual words do not by themselves convey complete meaning. Only after we have organized groups of words into recognizable patterns do ideas emerge. And these ideas, these groups of words, must follow one another in such a way that the relationship between the ideas is clear in forming larger meanings.

4.5.1. We are most effective as instructors when we present ideas that have meaning for the audience in terms of their own experience and knowledge. Ideas build upon one another, forming patterns. If the pattern is not clear, meaning is lost. In a lesson we give our ideas to the listeners in such a way that they mesh with their existing knowledge to form meaningful patterns.

4.5.2. Planning and Organizing Your Lesson. By nature we like things to be orderly and logical. We will work hard to rationalize our own behavior or thoughts. But when others appear illogical, we usually make little effort to understand them. We stop listening to a speaker or we put aside a book when we have difficulty following the line of thought. Effective lessons, then, depend upon effective organization of the ideas to be taught. But how should you organize your ideas to form a logical pattern? To be effective you should plan a systematic approach to the job of organizing. The plan we recommend has five steps:

- Determine the objective.
- Master the subject material.
- List the important ideas.
- Group these ideas in a logical pattern.
- Prepare the introduction and summary.

4.5.2.1. These steps overlap, of course, but they indicate the type of activity that should be stressed at a given time.

4.5.2.2. Determine the Objective. This first step is perhaps the most important. What do you want to accomplish in the lesson? This goal will give direction to your organization. Three factors will affect your final choice of objectives: the audience, the time available to you, and the mechanics.

4.5.2.2.1. Why do you need to know your audience? Obviously this is the only way to find out what their common core of experience is. Your objective and the pattern of your organization can have meaning only in terms of common experience. In order to understand your audience, you will want to know the level of their training and skill, their ages, and their previous knowledge about your subject. However, an even more important reason for knowing your audience is to determine what they need to know about the subject. By ascertaining and meeting their needs, you fulfill your purpose as an instructor. Conversely, if you teach something they don't need to know, you are wasting time, money, and materials.

4.5.2.2.2. The second factor is time. Students expect to learn something about the subject. Unfortunately, some instructors select a subject so broad that only the most general treatment is possible in the time allotted. Then the audience feels mistreated because they have learned very little. You can hope to accomplish just so much in 10 minutes, 30 minutes, or 45 minutes, so you must limit your subject to some phase which can be handled adequately in the time at your disposal.

4.5.2.2.3. Finally, you must consider the mechanics. Is it a class or a briefing? Will 10 or 100 attend? Where will the meeting be held? How large is the room? What training aids will be available? Certainly your objective will be affected by the mechanics.

4.5.2.2.4. When you know how much material you can cover, what part will be needed most, at what level it will be best understood, and what approach will be most appropriate, you will then be prepared to state your objective. Revision may be necessary later, but you should have a finite goal as your basic foundation.

4.5.2.3. Mastering the Subject. With your objective in mind, you are ready for the second step, mastery of the subject. Three sources of information will prove helpful. The first source is your own knowledge and experience. What do you really know about this subject? Do you know enough to teach it now or will you have to study it further?

4.5.2.3.1. You can turn to others who know something about your subject such as the people who work with you, the mechanic on the line, or the instructor in a related field. These people can help you check off additional items on the tentative outline. In discussing the subject with them, you clarify your own thinking.

4.5.2.3.2. The amount of primary research required is dependent on the scope of your objective and how much knowledge you have acquired from other sources. It may be that you can study the actual object you are prepared to discuss, or you may perform the actual skill you are planning to teach. You may also look for research material in the Tech Order file or in the library. If you have properly narrowed the subject, you will have to research only a relatively small portion of the total subject.

4.5.2.3.3. As you converse, read, and observe, you are evaluating ideas. Tentatively screen material to see if it is relevant to your objective. From the preliminary screening you will proceed to the third step.

4.5.2.4. List Important Ideas. What should a listener or reader know about this subject? What ideas must you get across if you are to achieve your purpose? From the material you have gathered, make a list of all the ideas that might be important, without

attempting to evaluate or expand upon them at this point. Write a word or phrase about each idea until you have listed everything you can think of. Now you are ready to evaluate these ideas. Some are discarded as irrelevant or unimportant; others can be grouped into two or three categories. These are your main ideas. Remember that you can adequately support only two or three main points in 30 minutes unless you have a fairly simple subject. Even in an hour presentation, you would find it difficult to cover more than four or five main points. The listener or reader should not be asked to remember too many points. Two or three well-developed main points will help the student recall the supporting material that you have used.

4.5.2.5. Select a Pattern. You are now ready to select the best and most logical way to present your ideas.

4.5.2.5.1. Usually your central idea will lend itself to one of many patterns of development. Probably the most commonly used is the time pattern. This is a straight narrative report of events in a chronological order. The enumeration pattern involves listing reasons as support of a proposal or contention. When a subject is too broad to handle completely, it can sometimes be clarified by use of the specific instance pattern. The cause-and-effect pattern explains the forces or circumstances that produce a particular occurrence, and the comparison contrast pattern identifies a choice between two or more proposals. Finally, the negative-alternative pattern measures ideas against a common criterion.

4.5.2.5.2. The logical choice of pattern is usually the one which best accomplishes your overall objective. Choose the pattern that presents your material to the audience in a way that makes sense to them. This is your strategy of attack. You should follow the patterns to develop supporting points.

4.5.2.6. Prepare an Introduction and Summary. When you know what you are going to introduce and what you are concluding, you can add these steps to the organizing process. To attempt this before you have determined the basic content of the lecture is like trying to decide what to take on a trip before you know where you are going.

4.5.2.6.1. An introduction should first catch your audience's attention. You might use a vivid example, a joke, or a surprising statement. Then you must hold the audience's attention by showing why this information is important to them. After you motivate them, tell them briefly what you plan to cover. The overview simply alerts them to look for your main points. You should also review any previous lessons which may form a foundation for better understanding of the information to be presented.

4.5.2.6.2. Applying this recommended plan to your own use should make your presentation purposeful, logical, and complete. But this plan will succeed only if you are always conscious of the fact that you are organizing material for the student - not for yourself. You can measure the effectiveness of your lesson only in terms of its meaning for others.

4.6. Methods of Supporting Ideas. If each main point and subsection in your lesson outline is to be clear and convincing, it must be developed and supported. Bold assertion is not enough. Your students are silently demanding: "For instance?" "So what!" They are asking you to explain, clarify, or prove what you are saying. They want you to get down to specific cases. You can meet their demands if you include examples, comparisons, statistics, and testimony, for these are the muscles that give body to the skeleton outline of the lesson plan.

4.6.1. Examples. The use of vivid, concrete examples is one of the biggest helps in putting ideas across. Examples have high interest and attention value. However, they must clearly support your ideas and be suited to the student's background and experience.

4.6.2. Comparisons. A comparison is a bridge between the known and the unknown. You can make a new idea clear by showing its similarity to something that is already familiar to your students. You may compare subjects, ideas, and situations. Comparisons are an excellent device for simplifying complicated ideas.

4.6.3. Statistics. Figures are variable facts, scientifically collected and classified. Used wisely and sparingly, they strengthen and add authority to your statements and clarify otherwise vague ideas.

4.6.4. Testimony. In the use of testimony you quote or paraphrase the opinion of an expert to back up an idea. Use qualified authority, someone who is an expert in his or her field by reason of training, education, and experience.

4.6.5. If the instruction seems boring to the students, you can be almost certain that you have used dull and inappropriate supporting materials or have not used enough supporting materials.

4.7. Effective Lesson Delivery. After you have planned, organized, and supported your ideas, the final test is how well you present them to your students. You are not interested in cultivating effective delivery for its own sake, but vitally concerned that your ideas get a fair hearing. The test of your delivery is how well you hold the students' attention to those aspects of your presentation which promote your objectives. Anything distracting in your delivery draws attention from your main ideas. You can improve your delivery only through practice and valid, unbiased criticism. Some suggestions are given here to help you in your practice.

4.7.1. Directness. Have you ever attended a lecture in which the instructor seemed to be addressing the ceiling, a knot in the door, or someone outside the classroom? One of the most common faults of speakers is the failure to develop a sense of communication with the audience. They seem to forget that the purpose of speaking is to communicate ideas calculated to win a desired response. The lack of a communicative attitude seriously weakens any presentation.

4.7.1.1. In its broadest sense, directness means that you are talking to, and with your students, not simply at them or in front of them.

4.7.1.2. More specifically, directness means eye-contact. The failure to look into the eyes of your students usually indicates fear or timidity on your part. No one follows a frightened leader!

4.7.2. Sincerity. Sincerity is a deep belief in the importance of your subject, and in the correctness of the information which you are presenting. Sincerity reveals itself through your voice, action, and facial expression.

4.7.3. Use of Notes. In many instances you should be able to teach effectively without notes. If you have properly prepared your lesson and have thoroughly assimilated the material and the basic outline, you should have no difficulty.

4.7.3.1. There is no serious objection to the use of notes, and they do have certain advantages. They ensure accuracy, jog the memory, and dispel the fear of forgetting. They are essential for reporting complicated information and they help an otherwise rambling instructor stay on the track.

4.7.3.2. You should use your notes sparingly and unobtrusively. At the same time, make no effort to hide them from the students. Place them on the lectern where you can refer to them before you actually need them.

4.7.4. Dissipating Nervous Energy. When you have a good approach to a subject it allows you to proceed with confidence. However, most people experience some anxiety before a presentation. One humorist said the best way to take care of this initial nervousness was to “talk loud so they can’t hear your knees knocking together.”

4.7.4.1. There is no reason to be concerned about being keyed up and nervous. In fact, if you are not nervous, something is wrong with you. If you are completely unruffled inside, you aren’t ready to go on the platform. You are going into the spotlight and you should be stimulated so you will be able to be spontaneous and exude energy, enthusiasm, and interest.

4.7.4.2. To dissipate the nervousness naturally and appear to be confident at the same time, enter the classroom resolutely. Approach the class with a firm step and then pause to survey the “adversary.” Try looking the people in the eye and then smile. A smile is even more contagious than a yawn. Charging right into the presentation without an initial pause deprives you of the opportunity to compose yourself without the distraction of hearing yourself talk.

4.7.4.3. Some purposeful physical action helps get through the initial nervous period. Write your name on the blackboard, move the podium to a better angle, take the paper clip off your notes, but don’t start off by being an ear puller, a nose rubber, or a head scratcher. Once you begin speaking, purposeful gestures reduce nervousness, dissipate physical energy, and add to your effectiveness.

4.7.4.4. You have to do something with those seemingly monstrous appendages at the ends of your arms, so use them. Point, gesture, put your hands in your pockets. Relax your posture when you want to get more folksy and tell the class a war story or a joke on yourself. Then, when you go back to serious instruction and indicate you want renewed and slightly more formal attention to the next subject, get your posture more businesslike and a little less relaxed.

4.7.4.5. In other words, make your posture, gestures, and movements on the platform support the feeling you want to convey. Start building a point while behind the podium or near the blackboard, and move toward the group to make the final point or draw the conclusion.

4.7.4.6. Your use of voice can also dissipate nervousness and portray confidence. Make your opening statement a loud and clear transmission. It assists in gaining even the attention of the avid conversationalists and tends to give the impression that you have taken charge of the situation. You can and should plan specific steps to perform during the introduction to dissipate the initial tension. Tension is natural, but the stiffness in manner and speech, which it can cause, occasionally gives the impression of aloofness or coolness toward the group. The sooner you can get the knee-knocking portion out of the way, the sooner you can warm to the group and the subject and the group will respond in a like manner.

4.7.5. Questioning Technique. Questions should be thought provoking, clearly worded, planned for a specific purpose, and centered on one idea. The three basic types of questions most often used are: overhead, directed, and relay.

4.7.5.1. Overhead Question. To get everyone mentally involved in formulating an answer, throw an overhead question to the group as a whole. Pause to give everyone time to think of an answer and let the bright, eager beavers sit for a minute with a raised hand. You’re also concerned with the slower thinker. After a reasonable pause, let one of the hand raisers answer the question.

4.7.5.2. Direct Question. If there are no hands raised, direct the question to one individual. A directed question is also particularly useful to bring a day dreamer back into the classroom or to check the learning of specific individuals. Distribute questions fairly and restrain the brighter ones from answering too many questions, even though the lesson would move along faster if you let them. After choosing a student to answer, listen carefully to that answer and evaluate it.

4.7.5.3. Relay Question. You can let the bright students into the act with relay questions. When a student asks a question of you, relay it to one of the brighter ones, if practicable.

4.7.5.4. Another version of the relay question is the reverse query, where you ask one or two questions in return to lead the questioner into answering his or her own question. This is sometimes necessary because students often ask questions spontaneously without attempting to think out an answer.

4.7.6. Fielding Student Questions. Oddly enough, one of the most difficult parts of instructing is understanding student questions. Have you noticed how often a fellow student asked one question and got the answer to another? Everyone understood the question but the instructor. Remember that the question is based on what the student knows about the material, not on what you know. If you are not sure just what is wanted, ask clarifying questions until you are sure. Repeat the question aloud. Evaluate the question in terms of what has been taught, what will be taught, and what they should know, then answer it. Be sure that you have satisfied the student before going on to other material.

4.7.7. Using Humor. Humor can be used to maintain interest and it need not break the line of thought. There is humor in the way you've seen someone approach the problem at hand, in many facets of instrument flying, and even in a near crash. Exaggeration of some of the mistakes of some unidentified pilot is another source of humor. However, jokes are too often considered the only source of humor and are too often unrelated to the subject. You can find jokes which are related, applicable, and fit in well.

4.7.8. Personal Habits. Personal habits can negate all the planning, research and preparation that go into a delivery. Proper eye contact with the group can establish a feeling of personal conversation with each person. Poor eye contact gives the impression of distraction. Also, poor use of bodily movements can cost you more than good use will add. So, if you catch yourself getting into bad physical habits, just hold still. Then, when your composure returns, start getting active again by degrees. Movement about the platform, to transfer attention from one training aid to another, is good. However, if you wave the pointer, toss the chalk, have noisy heels, or jingle your change while moving to the new aid, the attention stays on you instead of transferring to the training aid. Making random adjustments on a training aid is distracting. On a platform you are generally the one least aware of your physical movements. Your habits are not obvious to you and it's hard to critique yourself. To correct this, you might watch yourself in a mirror, video tape yourself, or get a constructive audience of cohorts during dry runs.

Chapter 5

WHAT DO YOU TEACH?

5.1. General. Before you can determine what to teach you must know who your audience is, what they already know, and what type of information they need. Some of the areas to be considered in determining the training needs of your unit are:

5.1.1. Who will attend refresher training?
- Primary mission pilots?
- Mission support pilots?
- Pilots attached to your unit?
- Pilots from other units?

5.1.2. What is the experience of the pilots who will attend?
- Years as rated pilots?
- Amount of weather and night time logged?
- Types of aircraft previously flown?
- Present aircraft qualification?

5.1.3. What type of instrument flying is done by the pilots who will attend?
- Low altitude approaches?
- High altitude penetrations?
- CAT II ILSs?
- ICAO procedures?
- Night formation?

5.1.4. Other questions you should consider when determining training requirements include:
- Are there any instrument related mishaps that should be discussed?
- Are there any instrument related trends on flight checks from Stan/Eval?
- Is there a difference between the pilots' experience, proficiency, frequency of scheduled flights, or types of aircraft and missions? Should specialized training be conducted in some areas? This is a highly critiqued area of the IRC program. If possible, separate pilots into groups according to their type of aircraft experience.
- Could you reach more pilots by conducting the training at remote sites?
- In addition to IRC, would your unit benefit if a weekly or monthly "hot poop" letter were mailed to every pilot? Many units are providing this service and find it an excellent medium to put out the word.

5.1.5. Determining what you teach in your IRC will probably be the most difficult part of setting up your program. We cannot tell you every subject you need to teach. You must select the subjects that will aid in the accomplishment of your unit's

mission. This should be a joint decision by your commanders, the instructors in your unit, and you. Try to stay away from the topics that will require reading from regulations or other publications. Most of these are already covered in the open book instrument test. Unless you feel your unit is particularly weak in a regulation or publication, the instrument test will sufficiently cover these areas. You should spend most of the IRC reviewing procedures and techniques that your pilots don't see on a daily basis that will enable them to survive the departure and recovery phase of their mission.

5.1.6. Before determining what to teach you should answer the question "why do we have an IRC?" AFI 11-401 lists three items to be satisfactorily accomplished on a regular basis in order to maintain an instrument qualification in an Air Force aircraft; an Instrument Refresher Course, an instrument examination, and an instrument check in the aircraft. Most pilots understand what the aircraft instrument check is for, especially since the requirements for the flight are spelled out in Air Force and MAJCOM regulations. The requirements and intentions of the exam and the IRC are not so clear.

5.1.7. The instrument examination is designed to provide pilots a review of instrument regulations and publications. When building the instrument examination, IRC instructors should select questions they feel their pilots need for a review of applicable regulations and publications. The content of the selected questions should not be just information used on a daily basis, but topics that pilots may need to successfully complete the unit's mission under abnormal conditions. For example, if you unit flies mostly in the CONUS and only rarely deploys overseas, then ask more questions about international flight planning so your pilots will have a chance to review the appropriate directives.

5.1.8. The primary objective of the IRC should be to provide your pilots with sufficient knowledge and techniques to cope with any instrument procedure they may encounter. Most pilots are pretty good at mastering the normal departure and arrival at their home base, especially if they've been assigned to the base for a while. These normal day-to-day type operations should not be the basis for your IRC. For example, if your pilots regularly fly radar vector departures, more time should be devoted to Standard Instrument Departures (SIDs). Now, when one of your pilots diverts to a base requiring a SID, the bag of knowledge you provide should allow the pilot to safely and properly fly the SID procedure. Other examples would be divert base approach information, missed approach procedures and techniques (few pilots have accomplished "real" missed approaches), deployment enroute and terminal procedures, etc.

5.1.9. The following guidance should help you decide what to cover in an IRC.

- The IRC should refresh the pilot with information that is not seen on a daily basis. Review and reinforcement is required on a regular basis if a pilot's instrument knowledge is to remain at least at the UPT graduate level. You should be striving to raise your unit's instrument knowledge to a level above that.
- Procedures and information that have changed since the last IRC.
- Reinforcement of problem areas the wing staff, Stan/Eval, training officers, Air Traffic Control, base operations personnel, weather personnel, flight surgeons, etc. have identified as weak areas.
- Any instrument procedures the Wing deems necessary to ensure successful accomplishment of the mission.

5.2. Suggested IRC Topics. The subjects listed below should form the basis of your Instrument Refresher Course. Each subject needs to be tailored to meet the specific training requirements of your unit. It is not intended for all of the subjects to be taught at every IRC, but you can keep pilots interested in your IRC by varying the subject matter. The amount of time required to teach each subject has been purposely omitted, because you must determine the depth of training your pilots need. However, some subjects, such as regulations and flight information publications are constantly changing, and will require some portion of the allotted time for refresher training.

5.2.1. The following list of suggested topics is not all inclusive. The purpose of the list is to make your job of identifying topics easier. Select the ones that your pilots need to review and build your IRC around them, but don't attempt to teach all of them. If possible, vary the IRC course content to not only keep the audience's attention, but to also give the instructors some variety. Discussing winter weather during the winter months, emphasizing ICAO procedures prior to an upcoming deployment to Europe, or identifying trends found by Stan/Eval are examples of ways to vary the IRC content.

- AFMAN 11-217
- AFI 11-206
- FLIP (GP, AP1, etc.)
- NOTAM System
- Weather Services
- Microbursts & Windshear
- Lightning Avoidance
- Flight Plan Processing
- Radar Services
- Due Regard
- Lost Communications
- RNAV

- Advanced NAVAIDs (GPS and MLS)
- SIDs and Departure Procedures
- Holding Procedures & Techniques
- Instrument Approach Depictions & Approach Techniques
- Standard Terminal Arrival Routes (STARs)
- Radar Approaches
- Jeppesen Approach Depictions
- ICAO Approach Procedures
- Missed Approach & Climbout Instructions & Procedures
- Approach Lighting Systems
- Transition to Landing from Instrument Approaches
- Circling Approaches and Side Step Procedures
- Spatial Disorientation
- Air Force Pilots and the Federal Aviation Regulations (FARs)
- Head-Up Display (HUD) and Instrument Flight Reference
- Night Vision Devices (NVDs)

5.2.2. Subject outlines and briefings for many of these topics are provided on the HQ AFFSA IRC Home Page. These outlines/briefings will assist you in developing your own detailed lesson plans after performing the necessary planning and research discussed in Chapter 2. The outlines/briefings are not meant to be all-inclusive, nor are they a requirement for what you must teach. As a minimum, it should get you aimed in the right direction to providing a meaningful instrument training program for your pilots.

5.3. Lesson Plan. Sample lesson plan formats are also provided on the HQ AFFSA IRC Home Page. If you already have lesson plans in a format that meets your needs, don't change unless the change will help you do a better job. Updated standard IRC lesson plans will make reviewing the courses before teaching easier and will simplify the training of new instructors.

5.4. IRC Schedule. A typical IRC schedule is also provided on the HQ AFFSA IRC Home Page. You should provide a schedule to each student before class. This allows the student to see the subjects to be covered and the appropriate time for questions. Notice that each hour of instruction includes a 10 minute break. You need to allow your students frequent break periods to stretch and take care of personal needs in order to maintain their undivided attention. Again, you must structure your schedule to meet the needs of your unit.

JOHN P. JUMPER, Lt General, USAF
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GLOSSARY OF REFERENCES, ABBREVIATIONS, ACRONYMS

References

AFM 51-12, *Weather for Aircrews*
AFI 11-206, *General Flight Rules*
AFMAN 11-217, *Instrument Flight Procedures*
AFMAN 13-209, *US Standard for Terminal Instrument Procedures*
DoD Directive 4540.1, *Use of Airspace by U.S. Military Aircraft and Firings Over the High Seas*
FAA Order 7110.65, *Air Traffic Control*
FAA Order 7610.4, *Special Military Operations*
Federal Air Regulation (FAR) Part 91, *General Operating and Flight Rules*
ICAO Document 8168 (PANS-OPS)
ICAO Document 4444 (PANS-RAC)
Flight Information Publications (FLIP)
Flight Information Handbook (FIH)
Foreign Clearance Guide (FCG)

Abbreviations and Acronyms

AFAIS−Air Force Advanced Instrument School
AIFC−Advanced Instrument Flight Course
ARTS−Automated Radar Terminal Systems
ASDE−Airport Surface Detection Equipment
ASR−Airport Surveillance Radar
ATC−Air Traffic Control
ATIS−Automated Terminal Information Service
AWOS−Automated Weather Observing System
CRS−Composite Route System
EFAS−En Route Flight Advisory Service
FAA−Federal Aviation Administration
FAF−Final Approach Fix
FSS−Flight Service Station
GCA−Ground Controlled Approach
GPS−Global Positioning System
HAA−Height Above Airport
HAT−Height Above Touchdown
HIWAS−Hazardous Inflight Weather Advisory Service
HUD−Head-Up Display
IAF−Initial Approach Fix
IAP−Instrument Approach Procedure
ICAO−International Civil Aviation Organization
ILS−Instrument Landing System
IPIS−Instrument Pilot Instructor School
IRC−Instrument Refresher Course
MAJCOM−Major Command
MDA−Minimum Descent Altitude
MLS−Microwave Landing System
MNPS−Minimum Navigation Performance Specification
MOA−Military Operating Area
MTR−Military Training Routes
MVA−Minimum Vector Altitude
NAR−North American Routes
NOTAM−Notice to Airmen
PAR−Precision Approach Radar
PIREP−Pilot Report
PMSV−Pilot to Metro Service

RAPCON−Radar Approach Control
SID−Standard Instrument Departure
SIFC−SAC Instrument Flight Course
STAR−Standard Terminal Arrival Route
TACAN−Tactical Air Navigation
TAS−True Airspeed
TRSA−Terminal Radar Service Area
VDP−Visual Descent Point
VOR−VHF OMNI Range
VVI−Vertical Velocity Indicator